

7.6

Optics Assembly

The optics assembly comes with the two LED/phototransistor pairs, the four optics surfaces, and the five connector wires with crimp pins mounted on the optics carrier (refer to *Figure 7-5. Optics Carrier Detail*). The connector housing is attached after threading the wires through the motor frame.

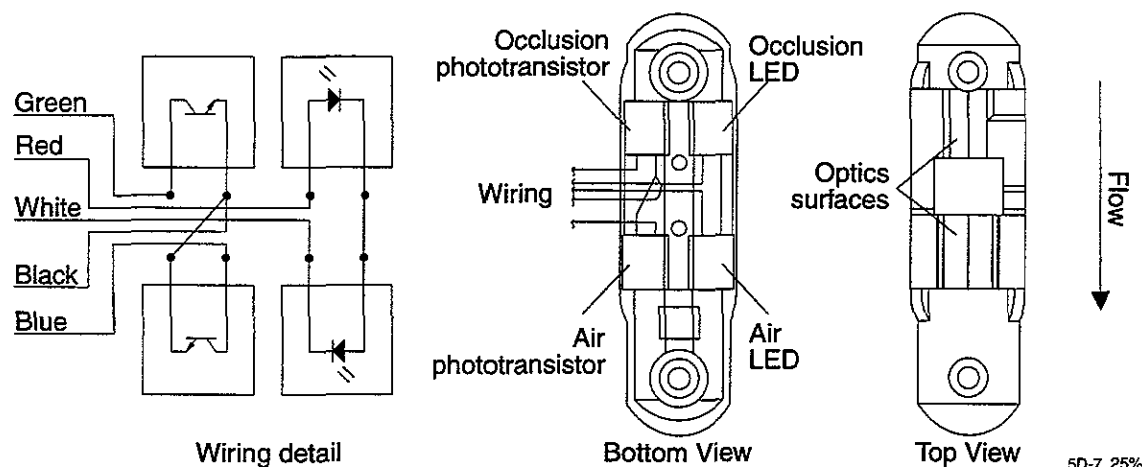


Figure 7-5. Optics Carrier Detail

7.6.1

Hardware Available

The following hardware may be replaced as needed:

- ☐ 2-56 x 1/4-inch fillister-head screws (2)
- ☐ 5-pin connector housing

7.6.2

Repair Procedure

1. Pull the crimp pins from the connector housing.
2. Remove the two screws holding the optics assembly to the motor frame and detach the optics assembly from the motor frame.
3. Place the new optics assembly on the motor frame by guiding the wires through the large hole in the motor frame and seating the optics carrier on the frame (refer to *Figure 7-7. Optics Assembly to Motor Frame*).
4. Secure the optics assembly to the motor frame with two 2-56 x 1/4 inch fillister-head screws and tighten.

5. Insert the pins into the 5-pin connector housing as shown in *Figure 7-6. Optics Wiring Detail*. Assure that the pins are locked securely into the housing by gently pulling on the wires.
6. Complete reassembly as directed in *Section 7.4, Pump Reassembly Procedure*, then complete the PVT and burn-in test as described in *Section 5, Maintenance and Service Tests*.

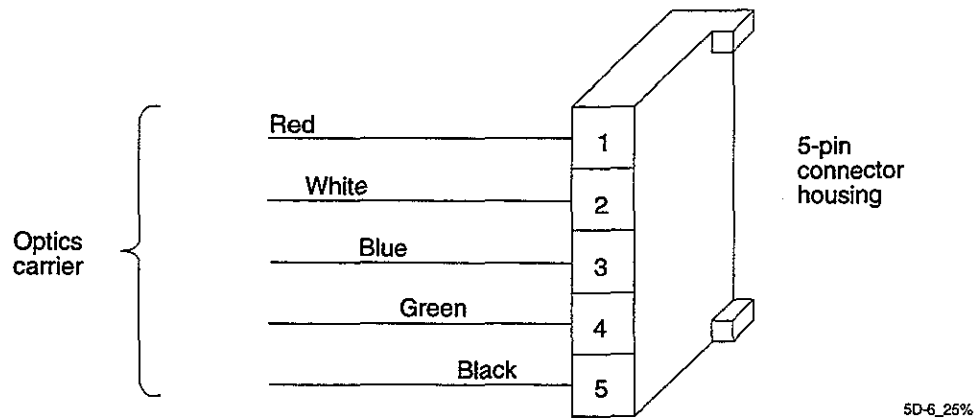


Figure 7-6. Optics Wiring Detail

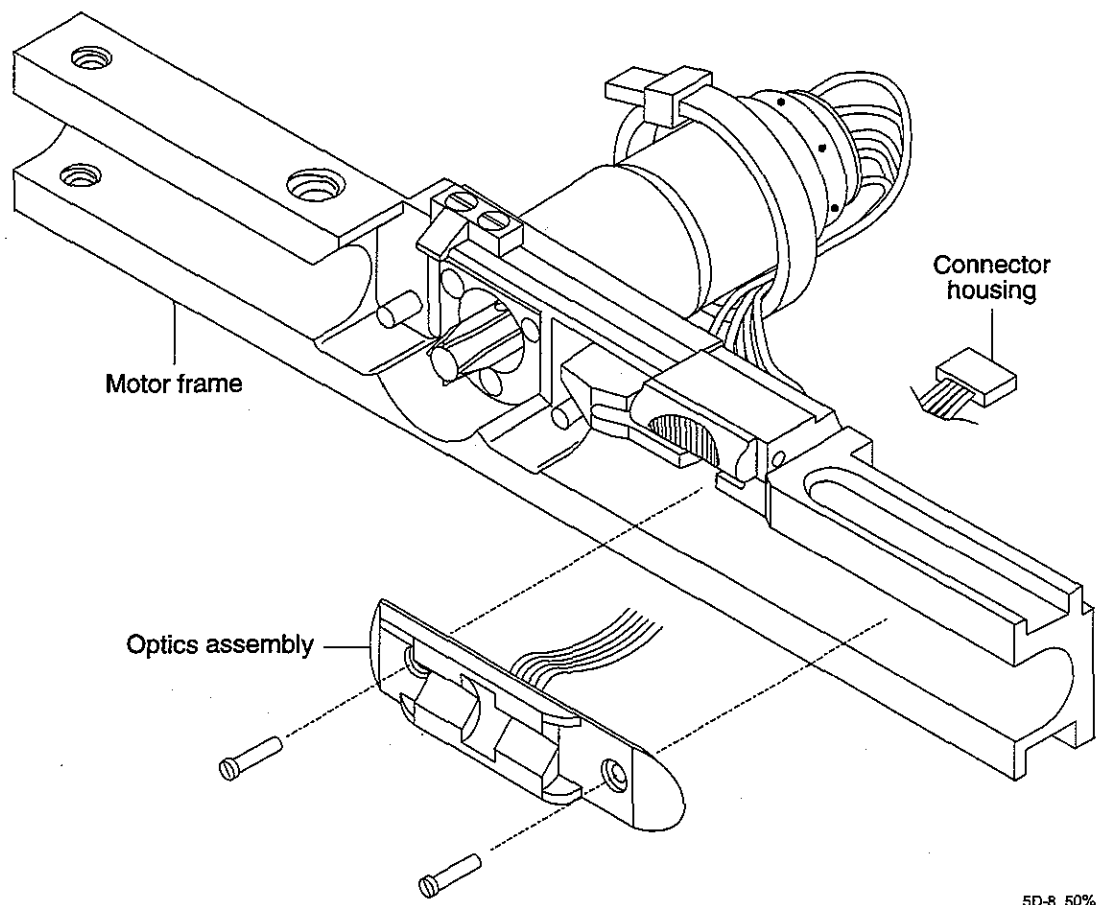


Figure 7-7. Optics Assembly to Motor Frame

7.7

Motor Assembly

The motor assembly comes with the motor, motor shaft extension, and motor connector wires and housing fully assembled.

Note: Loctite® Threadlocker 222 is required for this procedure.

7.7.1

Hardware Available

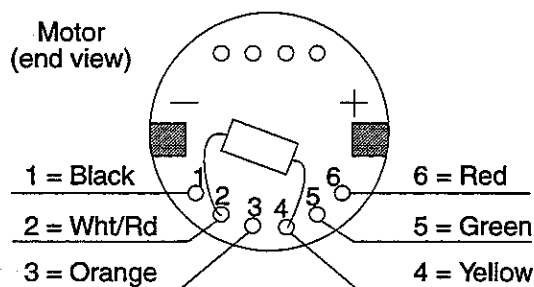
The following hardware may be ordered for replacement:

- ☐ M2 x 16 mm flat-head screws (3)
- ☐ 9-pin connector housing
- ☐ Wires (various colors)

7.7.2

Repair Procedure

1. Remove the three flat-head screws holding the motor to the motor frame and lift the motor from the frame.
2. Repair the wiring (refer to *Figure 7-8. Motor Wiring Details*) or replace the assembly.
3. After the repair is completed, place the motor through the back of the motor frame. Align the motor mounting holes to the screw holes in the motor frame with the motor wires toward the optics carrier end of the motor frame.



Note: If resistor is installed, attach white/red wire to resistor lead, otherwise attach wire directly to pin 2. Yellow wire will not be present if resistor is on motor.

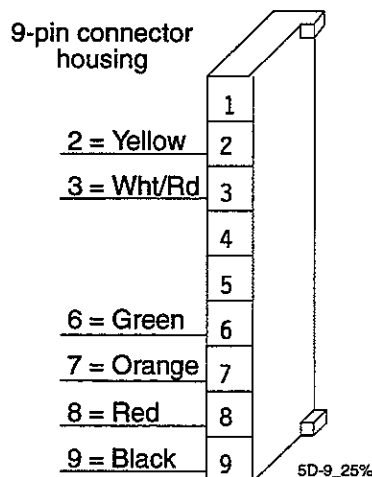


Figure 7-8. Motor Wiring Details

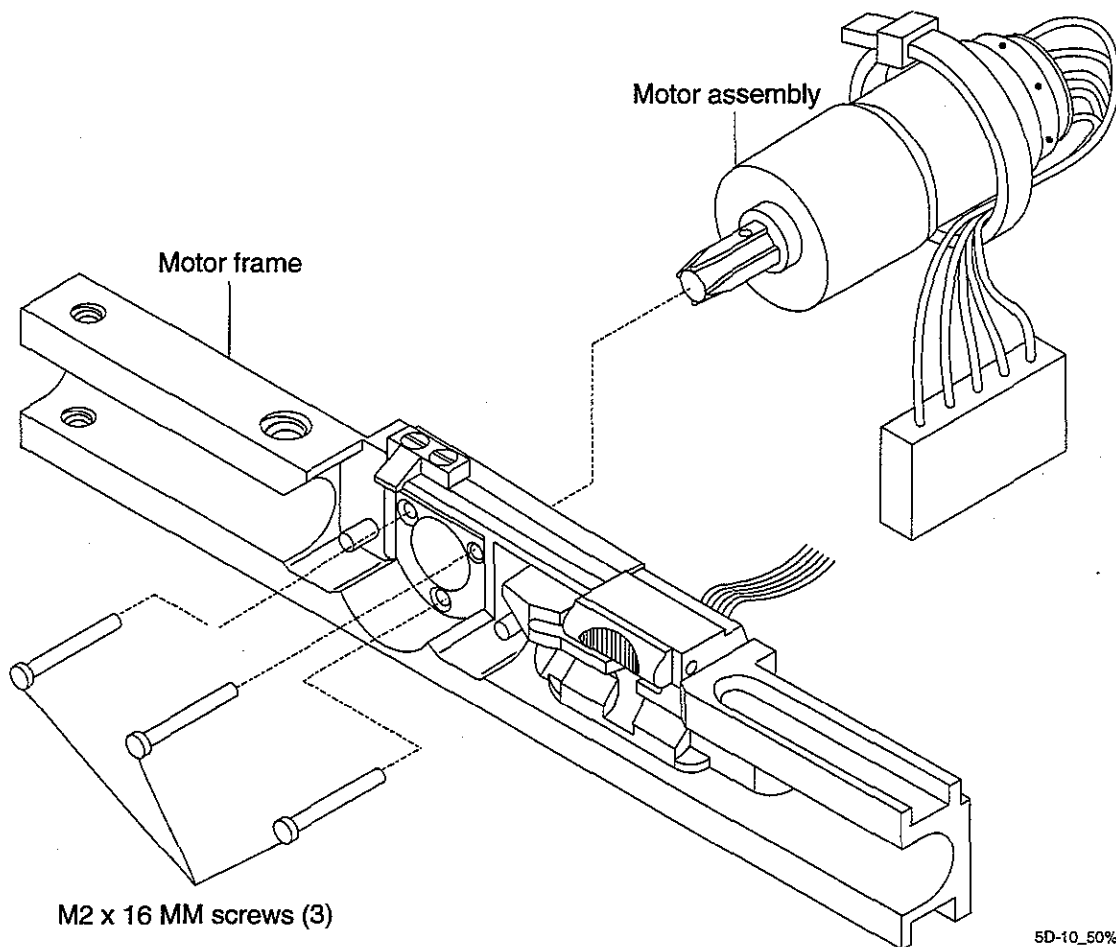


Figure 7-9. Motor Assembly to Motor Frame

4. Apply the Threadlocker to the three M2 x 16 mm screws and thread into place (refer to *Figure 7-9. Motor Assembly to Motor Frame*). Tighten the screws.
5. Complete the reassembly as directed in *Section 7.4, Pump Reassembly Procedure*, then complete the PVT and burn-in test as described in *Section 5, Maintenance and Service Tests*.

7.8

Latch Assembly

The latch assembly comes fully assembled.

7.8.1

Hardware Available

Ejector pivot pins (2) may be ordered separately for replacement.

7.8.2

Repair Procedure

1. Remove the ejector pivot pins and lift the latch assembly from the motor frame (refer to *Figure 7-10. Latch Assembly to Motor Frame*).
2. Position the replacement latch assembly into the motor frame and insert the pivot pins.
3. Complete the reassembly as directed in *Section 7.4, Pump Reassembly Procedure*, then complete the PVT and burn-in test as described in *Section 5, Maintenance and Service Tests*.

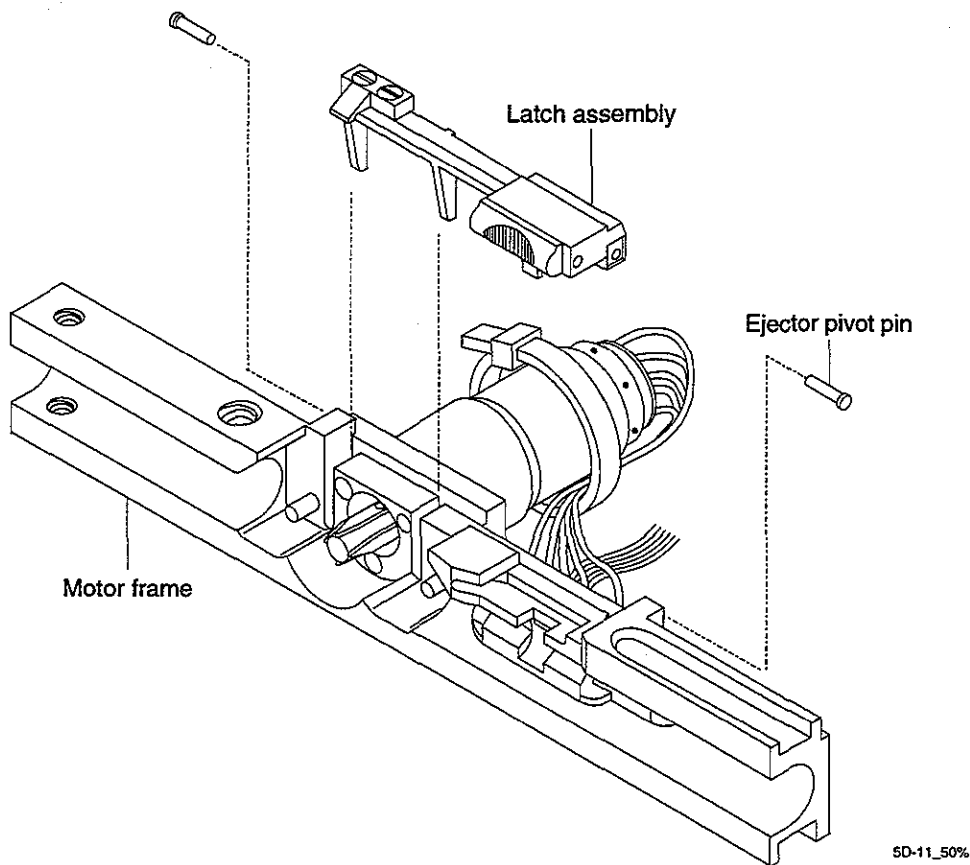


Figure 7-10. Latch Assembly to Motor Frame

7.9

PCB Assembly

The PCB assembly comes fully assembled and tested. Refer to *Section 9, Drawings*, for detailed schematics and drawings of the APM and APM II printed circuit boards.

7.9.1

Components Available

The following components may be replaced individually:

- ☐ Beeper
- ☐ Bolus Jack
- ☐ 12-VDC Power Jack
- ☐ Lithium Battery
- ☐ LCD Module

7.9.2

Materials Required

Soldering iron and solder are used to replace bolus jack, power jack, lithium battery, and beeper. RTV is used to reattach the resonator to the PCB when replacing the beeper.

7.9.3

Repair Procedure

CAUTION: The PCB assembly is electrostatic sensitive. Use ESD safety and precautionary methods while working with the PCB.

Replace individual components as described in the following sections. After replacing the entire PCB assembly or any individual component, complete reassembly as directed in *Section 7.4, Pump Reassembly Procedure*, then complete the PVT and burn-in test as described in *Section 5, Maintenance and Service Tests*.

7.9.3.1

Beeper

1. Remove resonator from around beeper. Clean off old adhesive from around resonator.
2. Remove solder and lift beeper off of the PCB.
3. Place replacement beeper on PCB and solder in place (refer to *Figure 7-11. PCB Back Detail*).
4. Apply RTV to resonator. Replace the resonator around the beeper then seat on the board.

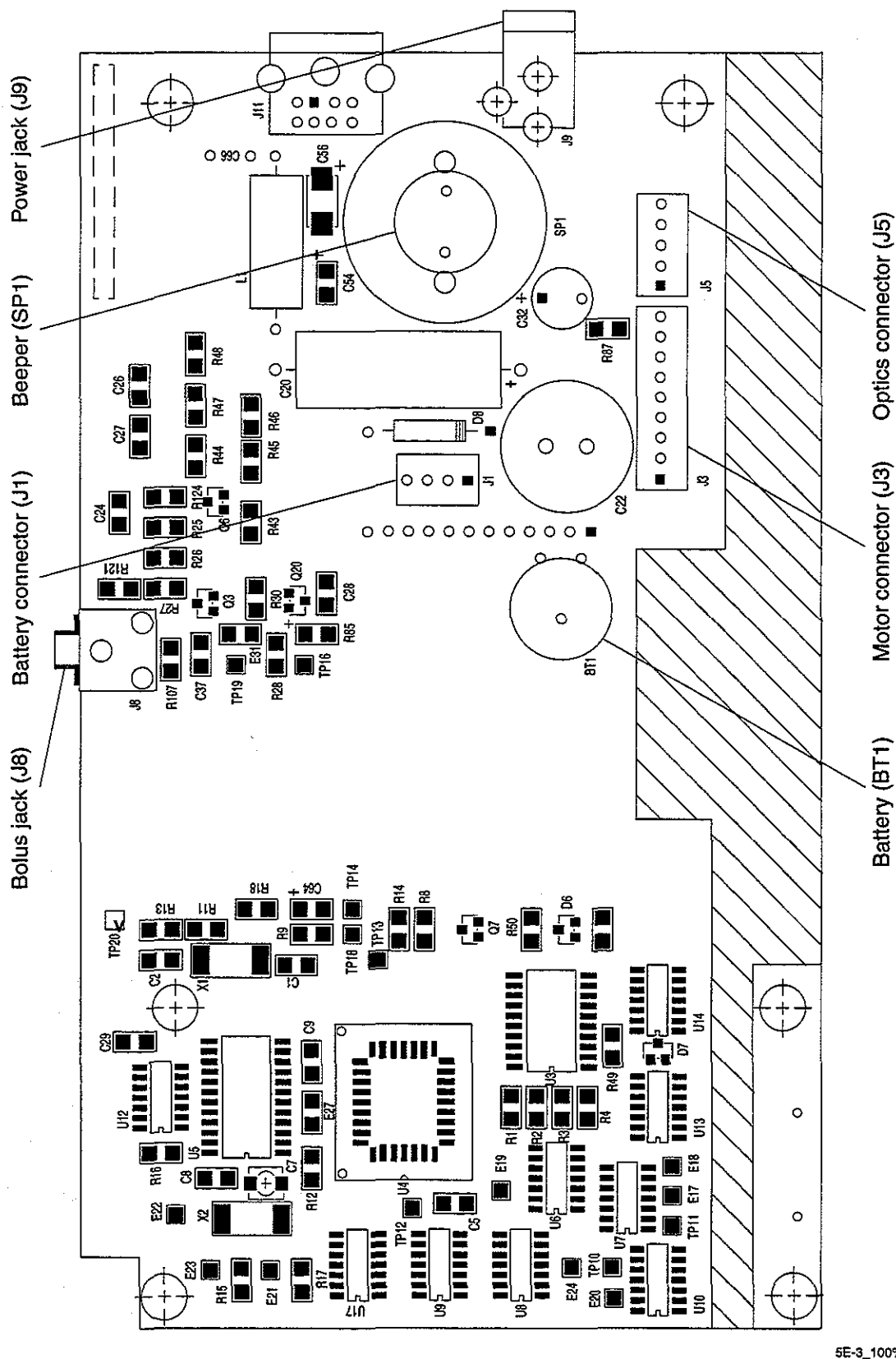


Figure 7-11. PCB Back Detail

7.9.3.2**Bolus Jack**

1. Remove solder and lift bolus jack off of the PCB.
2. Place replacement bolus jack on PCB and solder leads (refer to *Figure 7-11. PCB Back Detail*).

7.9.3.3**12-VDC Power Jack**

1. Remove the solder and lift the 12-VDC power jack off the PCB.
2. Place the replacement 12-VDC power jack on the PCB and solder leads (refer to *Figure 7-11. PCB Back Detail*).

7.9.3.4**Lithium Battery**

1. Remove the solder and lift the lithium battery off of the PCB.
2. Place the replacement lithium battery on the PCB and solder leads (refer to *Figure 7-11. PCB Back Detail*).

7.9.3.5**LCD Module**

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1. Gently pull the LCD module up and off of the PCB, being careful not to damage the guide pins.
2. Assure that the connectors of the replacement LCD module are aligned with the guide pins on the PCB, then snap the display securely into place (refer to *Figure 7-12. LCD Module Mounted on PCB*).

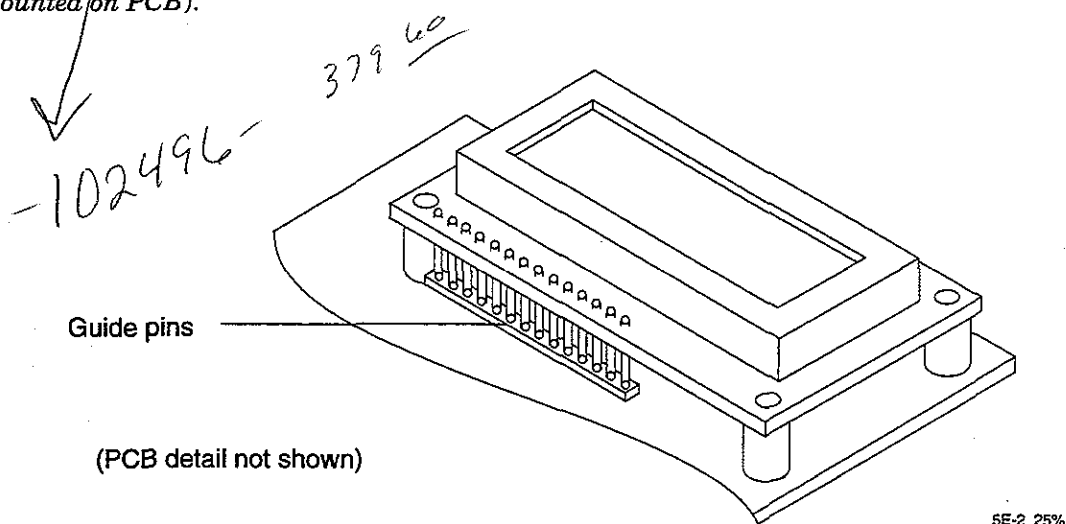
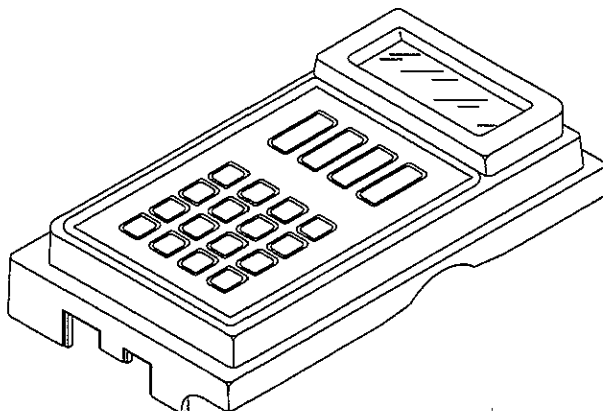


Figure 7-12. LCD Module Mounted on PCB

7.10

Front Case Assembly

The front case assembly comes fully assembled (refer to *Figure 7-13. Front Case Assembly*).



5B-2_25%

Figure 7-13. Front Case Assembly

7.10.1

Component Available

The LCD window may be replaced individually (refer to *Figure 7-14. LCD Window to Front Case*).

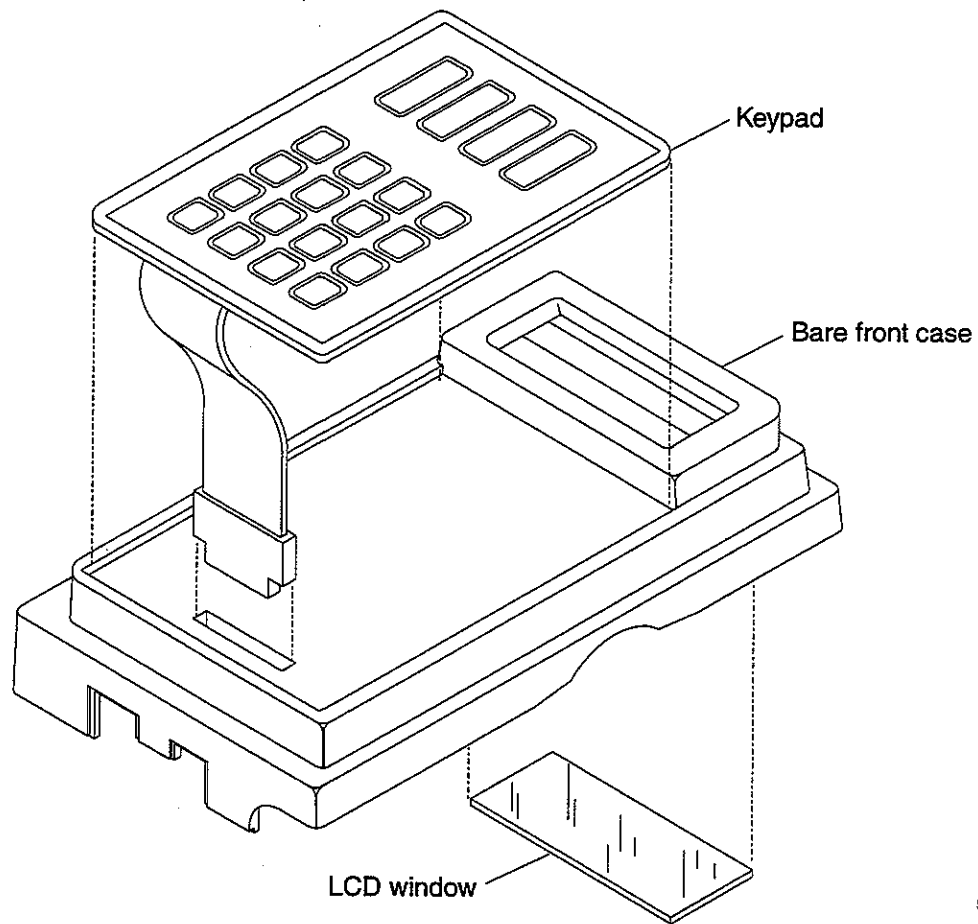
7.10.2

Repair Procedure

After replacing the entire front case assembly or the LCD window, complete reassembly as directed in *Section 7.4, Pump Reassembly Procedure*, then complete the PVT and burn-in test as described in *Section 5, Maintenance and Service Tests*.

To replace the LCD window, proceed as follows:

1. Detach the LCD window from the front case, being careful not to damage the case or keypad.
2. If necessary, clean the inner front case surface with isopropyl alcohol and allow to dry completely.
3. Remove the paper adhesive protector from the matte surface of the LCD window and place inside the front case facing the front.
4. Rub the back of the window to assure a complete sealing of the window adhesive to the front case.
5. Remove the clear protective cover from the smooth surface of the window.



5B-1_50%

Figure 7-14. LCD Window to Front Case

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Section 8

Specifications

Physical

Dimensions: 17.1 (H) x 10 (W) x 5.8 (D) cm (6.75 x 4.0 x 2.3 inches)

Weight: Approximately 1.0 kg (2 pounds)

Functional

Pump Mechanism: One microcomputer-controlled eccentric-rotor peristaltic motor

Display: Two-line, liquid crystal display (LCD) with backlight
On AC power: continuously backlit
On battery power: continuously backlit during programming, program review, and history display. At other times, the backlight is activated by keystrokes and remains on for three seconds after the keystroke. Pressing the remote bolus switch does not activate the backlight

Time of Day Clock: 12-hour clock with AM/PM displayed adjustable to 24-hour clock without AM/PM displayed

Accuracy: ± 3 minutes/month or better

Operating Controls: Keypad: 24 membrane-type switches
ON/OFF: One electromechanical switch
Remote Bolus: Jack for remote switch connection

Printer Interface: Jack and isolated interface circuit
Printers: Kodak Diconix 150 Plus or 180si, or Seiko DPU411
Printer Port: RS232C serial interface port

Memory Protection: Nonvolatile memory of up to 256 events for up to one year when batteries are removed from pump

Electrical Safety: Meets CSA (NRTL) guidelines and IEC 601-1-1 and 601-1-2 standards

Environmental

Temperature Ranges: Operating: +10 to +40 degrees Celsius
Shipping and Storage: -20 to +60 degrees Celsius

Relative Humidity: 10 to 90 percent

Atmospheric Pressure: 0 to 10,000 feet (0 to 3,000 m) equivalent pressure

Power Sources

AC Power: AC power indicator: Amber colored LED next to the international plug icon on the keypad; illuminated LED does not indicate if the voltage is correct

Use Abbott List 13036 AC Power Adapter with 3.6 m (12 ft) cord and molded plug

Power Supply	Input	Output
13036-04 (domestic)	115 VAC 60 Hz 0.18 A	12 VDC 0.4 A
13036-24 (int'l table top)	220-240 VAC 50 Hz 12 VA	12 VDC 0.3 A
13036-36 or -54 (int'l or UK wall plug-in)	230 VAC 50 Hz 12 VA or 0.10 A	12 VDC 0.4 or 0.5 A

Disposable Batteries: Two 9-V Duracell alkaline batteries
Capacity: Approximately four days at 6.0 mL/hr

Rechargeable Pack: Attachable separate battery pack
Recharge time: Full recharge requires up to six hours
Capacity: Approximately five days at 6.0 mL/hr

Occlusion Pressure

Occlusion Alarm Pressure: 45 psi (310 kPa)

**Maximum Delivery
Pressure:** 45 psi (310 kPa)

Alarms (Audible and Visual)

Low batteries	On batteries	Change batteries
Limit exceeded	Callback alert	Purge overuse
End of infusion	Empty container	Check printer
Check cartridge	Air-in-line	Occlusion
Amount too small	Amount too large	
System error	Internal malfunction	

Programmable Ranges

Entry	APM	APM II
Concentration	0.1 - 50.0 mg/mL 0.1 - 1000 µg/mL	0.1 - 50.0 mg/mL 1 - 1000 µg/mL
Delivery Rate	0.1 - 25 mL/hr 0.1 - 9999.9 mg/hr 0.1 - 9999.9 µg/hr	0.1 - 25 mL/hr 0.1 - 9999.9 mg/hr 1 - 999999 µg/hr
	mg and µg entries cannot exceed 25 mL/hr equivalent	
Bolus and Loading Doses	0.1 - 25 mL 0.1 - 9999.9 mg 0.1 - 9999.9 µg	0.1 - 25 mL 0.1 - 9999.9 mg 1 - 999999 µg
Flow rate: 125 mL/hr	mg and µg entries cannot exceed 25 mL equivalent	
Bolus Lockout Time	5 - 99 min. (dom) 5 - 999 min. (int'l)	5 - 999 min.
Delivery Limit	4 hour limit 0.1 - 1000 mL 0.1 - 9999.9 mg 0.1 - 9999.9 µg	1 or 4 hour limit 0.1 - 1000 mL 0.1 - 9999.9 mg 1 - 999999 µg
	Cont/Cont+Bolus: must be greater than continuous delivery over limit period Bolus Only: must be at least one bolus dose	
Container Size (Volume)	0.1 - 1000 mL 0.1 - 9999.9 mg 0.1 - 9999.9 µg	0.1 - 1000 mL 0.1 - 9999.9 mg 1 - 999999 µg
	mg and µg entries cannot exceed 1000 mL equivalent	
Air Sensitivity	High (pump alarms at approx. 100 µL) Low (pump alarms at approx. 300 µL) Off (air alarm off)	

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